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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,824	11/21/2003	Lav Ivanovic	030928/2935P	1337
Sandeep Jaggi LSI Logic Corporation Intellectual Property Law Dept. 1621 Barber Lane, M/S D-106 Milpitas, CA 95035			EXAMINER JANAKIRAMAN, NITHYA	
			ART UNIT 2123	PAPER NUMBER
			MAIL DATE 05/30/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/718,824

**Applicant(s)**

IVANOVIC ET AL.

**Examiner**

NITHYA JANAKIRAMAN

**Art Unit**

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/29/2008 has been entered. Claims 1-20 have been submitted for examination.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over “IMD-Software for modeling the optical properties of multilayer films” (hereinafter “Windt”) in view of “Pattern recognition by an optical thin-film multilayer model”, (hereinafter “Li”).
3. Windt teaches a method for obtaining an optimal reflectivity value for complex multilayer stacks (see page 368, column 1). Windt does not teach obtaining an optimal reflectivity value for a complex multilayer stacks that is simulated.
4. Li teaches modeling an optical thin-film multilayer model that has not been created (see Section 2).
5. Windt and Li are analogous art because they are both related to the field of multilayer films.
6. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the simulated multilayer model of Li with the obtaining of an optimal reflectivity value for complex multilayer stacks of Windt, because it would “take advantage of the optical properties for the purpose of computational learning” and “it can be used as a learning model” (Li, Introduction).
7. Regarding claim 1 (and 11), Windt and Li teach:

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A method (computer-readable medium) for obtaining an optimal reflectivity value for complex multilayer stacks (*Windt: see page 368, column 1*), comprising:

(a) generating a model of a simulated multilayer stack prior to production of the multilayer stack and (*Li: Section 2. The optical thin-film multilayer model*) parameterizing each layer by a thickness and an index of refraction (*Windt: see Introduction, 'Reflection and transmission at an ideal interface'*);

(b) allowing a user to input values for the parameters and to designate a plurality of the parameters as independent variables (*Windt: see page 365, 'User Interface'*);

(c) calculating an extrema for a cost function of reflectivity  $R$  using the input parameter values (*Windt: page 368, column 1*);

(d) calculating sensitivity values  $S$  for the extrema (*Windt: see page 360, "the relative sensitivities of the optical functions to the parameters that describe the multilayer structure"*); and

(e) obtaining the optimal reflectivity value for the simulated multilayer stack (*Li: Section 2. The optical thin-film multilayer model*) by calculating a cost function  $R+S$  using the plurality of independent variables at once (*Windt: see page 362, column 1, "...the reflectance can be reduced equally well by either a rough interface, in which the transition between the two materials is abrupt at any point or a diffuse interface, in which the index varies smoothly along the  $z$  direction or by an interface that can be described as some combination of the two cases"*; equations 4, 5(a). In this case, 'sensitivity' is equivalent to the diffuseness/roughness variable  $\sigma$ , which is used in the reflection coefficient modification factors  $w^*(s)$ ).

8. Regarding claim 2 (and 12), Windt and Li teach:

The method (computer-readable medium) of claim 1 wherein the obtaining (e) further comprises:

calculating the cost function as  $R+\alpha S$ , where  $\alpha$  is a weighted parameter (*Windt: see page 364, "weighting factors"*).

9. Regarding claim 3 (and 13), Windt and Li teach:

The method (computer-readable medium) of claim 1 wherein the generating (a) further comprises the step of:

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providing the simulated multilayer stack with N layers, where a top layer comprises a top ambient resist layer followed by one or more layers of materials that are patterned over a substrate layer (*Windt: see page 362*).

10. Regarding claim 4 (and 14), Windt and Li teach:

The method (computer-readable medium) of claim 2 wherein the generating (a) further comprises:

providing the index of refraction to include a real and an imaginary number (*Windt: see page 361, column 1*).

11. Regarding claim 5 (and 15), Windt and Li teach:

The method (computer-readable medium) of claim 4 wherein the generating (a) further comprises:

providing a  $j^{\text{th}}$  layer with thickness  $d_j$ , and a complex index of refraction  $n_j = n_{j-i} k_j$  (*Windt: see 'Optical functions of a multilayer stack'*).

12. Regarding claim 6 (and 16), Windt and Li teach:

The method (computer-readable medium) of claim 5 wherein the generating (a) further comprises:

providing the ambient and substrate with complex indexes of refraction:  $n_0 = n_{0-i} k_0$  and  $n_{N+1} = n_{N+1-i} k_{N+1}$ , respectively (*Windt: see 'Reflection and transmission at an ideal interface'*).

13. Regarding claim 7 (and 17), Windt and Li teach:

The method (computer-readable medium) of claim 6 wherein the generating (a) further comprises:

defining reflectivity at an interface between two layers as a cost function, wherein the reflectivity  $R_j$  at a  $j^{\text{th}}$  interface (between the  $(j-1)^{\text{th}}$  and  $j^{\text{th}}$  layers) is a function of  $3(N-j+1)+4$  parameters, which are:  $n_{j-1}, n_j \dots n_N, n_{N+1}; k_{j-1}, k_j \dots k_N, k_{N+1}; d_j, d_{j+1} \dots d_N$  (*Windt: see Figure 3, 'Optical functions of a multilayer stack', 'Optical constants determination for a thin film'*).

14. Regarding claim 8 (and 18), Windt and Li teach:

The method (computer-readable medium) of claim 1 wherein the allowing (b) further comprises:

allowing the user to enter values for the thickness and the complex indexes of refraction (n and k) for each layer, including a current starting point, a minimum values, and a maximum value for the thickness and the complex indexes of refraction for each layer (*Windt: see 'User Interface', 'Summary'*).

15. Regarding claim 9 (and 19), Windt and Li teach:

The method (computer-readable medium) of claim 8 wherein the allowing (b) further comprises:

allowing the user to enter step values for the parameters designated as independent variables, wherein those parameters that are not designated as independent variables are fixed (*Windt: see 'User Interface'*).

16. Regarding claim 10 (and 20), Windt and Li teach:

The method (computer-readable medium) of claim 1 wherein the obtaining (e) further comprises:

defining the sensitivity as  $S=(\text{Max } R - \text{Min } R)$  for all varied parameters (*Windt: see page 364, "a constraint on the range of acceptable parameter values can be specified as well", 'Confidence interval computation'*).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NITHYA JANAKIRAMAN whose telephone number is (571)270-1003. The examiner can normally be reached on Monday-Thursday, 8:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571)272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nithya Janakiraman/  
Examiner, Art Unit 2123

NJ

/Paul L Rodriguez/

Supervisory Patent Examiner, Art Unit 2123